



PATENT  
Docket No. 10321US01

cg-c

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: )  
 )  
Frank E. Aspen )  
 )  
Patent No.: 6,839,177 B2 )  
Issued: Jan. 4, 2005 )  
 )  
Serial No.: 10/075,901 )  
 )  
For: **ANTI-REFLECTIVE COATING FOR** )  
 **HOLOGRAPHIC DATA STORAGE** )  
 **MEDIA** )

**CERTIFICATE OF  
CORRECTIONS BRANCH**

**REQUEST FOR CERTIFICATE OF CORRECTION**  
**UNDER 37 C.F.R. 1.322 and 1.323**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Certificate  
JUL 28 2005  
of Correction

Dear Sir:

It is respectfully requested that a Certificate of Correction be issued in connection with the subject patent in accordance with the provisions of 37 C.F.R. 1.322 and Patent Office Notice dated January 24, 1975.

The error in line 6 of column 9, the first error in line 52 of column 10, and the error in lines 63-64 of column 10, first occurred in the printed patent and, thus, are not due to Applicant's mistake.

Applicant first became aware of the second error in line 52 of column 10 and the error in line 65 of column 10 upon proofing the patent. Because these errors were due to Applicant's mistake, a fee of \$100.00 is required in connection with the Request under 37 C.F.R. 1.323. Please charge the \$100.00 fee and any additional fees to Deposit Account No. 09-0069.

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JUL 29 2005

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Page 2

For the PTO's convenience, enclosed is a copy of our amendment dated July 23, 2004, entered by the Examiner. Applicant has circled the words that were misspelled in the issued patent and identified the issued claim number.

Respectfully submitted,

7/21/5  
Date

  
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# UNITED STATES PATENT AND TRADEMARK OFFICE

## CERTIFICATE OF CORRECTION

PATENT NO : 6,839,177 B2  
DATED : Jan. 4, 2005  
INVENTOR(S) : Frank E. Aspen

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

**Column 9,**

Line 6, "layer a" should read ~~—layer has a—~~.

**Column 10,**

Line 52, "coaxing" should read ~~—coating —~~ and "reflectively" should read ~~—reflectivity—~~.

Lines 63-64, "between, approximately" should read ~~—between approximately—~~.

Line 65, "layer of comprising" should read ~~—layer comprising—~~.

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PATENT NO. 6,839,177

No. of additional copies



JUL 29 2005



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Frank E. Aspen Confirmation No. 9302  
Serial No.: 10/075,901  
Filed: February 14, 2002  
Examiner: Audrey Y. Chang  
Group Art Unit: 2872  
Docket No.: 10321US01  
Title: **ANTI-REFLECTIVE COATING FOR HOLOGRAPHIC DATA  
STORAGE MEDIA**

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CERTIFICATE UNDER 37 CFR 1.8: I hereby certify that this correspondence is being transmitted by facsimile to the  
Commissioner for Patents, Alexandria, VA 22313-1450 on 23 July 2004

By: 

Name: Eric D. Levinson

**AMENDMENT**

Mail Stop Amendment  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

In response to the Office Action mailed April 23, 2004, the period of response for which runs through July 23, 2004, please amend the application as follows.

**Amendments to the Claims** are reflected in the listing of claims which begins on page 2 of this paper.

**Remarks/Arguments** begin on page 8 of this paper.

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## AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

### **Listing of Claims:**

Claim 1 (Currently amended): A holographic data storage medium including an anti-reflective coating on a surface of the medium, wherein the anti-reflective coating limits reflectivity such that causes the medium exhibits to have less than 1.0 percent reflectivity of S-polarized light at incident angles greater than approximately 50 degrees relative to a line normal to the surface of the medium, wherein the anti-reflective coating includes:

a first layer comprising Ta<sub>2</sub>O<sub>5</sub>,

a second layer comprising Al<sub>2</sub>O<sub>3</sub>,

a third layer comprising Ta<sub>2</sub>O<sub>5</sub>, and

a fourth layer comprising SiO<sub>2</sub>.

Claim 2 (Currently amended): The holographic data storage medium of claim 1, wherein the anti-reflective coating limits reflectivity such that causes the medium exhibits to have less than 1.0 percent reflectivity of S-polarized light at an incident angle of approximately 60 degrees relative to a line normal to the surface of the medium.

Claim 3 (Currently amended): The holographic data storage medium of claim 2, wherein the anti-reflective coating limits reflectivity such that causes the medium exhibits to have less than 0.5 percent reflectivity of S-polarized light at an incident angle of approximately 60 degrees relative to a line normal to the surface of the medium.

Claim 4 (Currently amended): The holographic data storage medium of claim 3, wherein the anti-reflective coating limits reflectivity such that causes the medium exhibits to have less than 0.25 percent reflectivity of S-polarized light at an incident angle of approximately 60 degrees relative to a line normal to the surface of the medium.

Claim 5 (Currently amended): The holographic data storage medium of claim 1, wherein the anti-reflective coating limits reflectivity such that ~~causes~~ the medium exhibits ~~to have~~ less than 1.0 percent reflectivity of S-polarized light at incident angles relative to a line normal to the surface of the medium greater than or equal to approximately 10 degrees and less than or equal to approximately 60 degrees.

Claim 6 (Original): The holographic data storage medium of claim 1, wherein the anti-reflective coating has greater than approximately 95 percent transmittance for the S-polarized light.

Claims 7-8 (Canceled)

Claim 9 (Original): The holographic data storage medium of claim 1, wherein the S-polarized light comprises S-polarized light having a wavelength of approximately 405 nanometers.

Claim 10 (Canceled)

8 Claim ~~11~~ (Currently amended): The holographic data storage medium of claim 1, 10, wherein:

the first layer has a thickness of approximately 83.3 nanometers,  
the second layer has a thickness of approximately 96.8 nanometers,  
the third layer has a thickness of approximately 42.0 nanometers, and  
the fourth layer has a thickness of approximately 75.0 nanometers.

Claim 12 (Currently amended): The holographic data storage medium of claim 13, wherein the S-polarized light comprises S-polarized light having a wavelength of approximately 532 nanometers.

Claim 13 (Currently amended): A holographic data storage medium including an anti-reflective coating on a surface of the medium, wherein the anti-reflective coating limits reflectivity such that the medium exhibits less than 1.0 percent reflectivity of S-polarized light at incident angles greater than approximately 50 degrees relative to a line normal to the surface of the medium,

~~The holographic data storage medium of claim 12,~~ wherein the anti-reflective coating includes:

- a first layer comprising approximately 80 percent by weight ZnS and approximately 20 percent by weight SiO<sub>2</sub>,

- a second layer comprising SiO<sub>[X]</sub>N<sub>[Y]</sub>, wherein X is a rational number between approximately 0 and 2 and wherein Y is a rational number between approximately 0 and 1.33,

- a third layer of comprising approximately 80 percent by weight ZnS and approximately 20 percent by weight SiO<sub>2</sub>, and

- a fourth layer comprising SiO<sub>2</sub>.

Claim 14 (Original): The holographic data storage medium of claim 13, wherein:

- the first layer has a thickness of approximately 108 nanometers,

- the second layer has a thickness of approximately 133 nanometers,

- the third layer has a thickness of approximately 55 nanometers, and

- the fourth layer has a thickness of approximately 99 nanometers.

Claim 15 (Original): The holographic data storage medium of claim 13, wherein a value of the sum of X/2 and Y/1.33 is approximately equal to 1.0.

Claim 16 (Original): The holographic data storage medium of claim 1, wherein the medium has a sandwich construction in which a photopolymer is sandwiched between two substrates, and wherein the anti-reflective coating on the surface of the medium comprises an anti-reflective coating of an outer surface of one of the substrates.

Claim 17 (Original): The holographic data storage medium of claim 16, further comprising anti-reflective coatings on outer surfaces of both of the substrates.

Claim 18 (Currently amended): A holographic data storage system comprising:

a laser that produces at least one laser beam;

optical elements through which the laser beam passes;

a holographic recording medium including an anti-reflective coating on a surface of the medium, wherein the anti-reflective coating limits reflectivity such that ~~causes~~ the medium exhibits to have less than 1.0 percent reflectivity of S-polarized light at an incident angle greater than approximately 50 degrees relative to a line normal to the surface of the medium, wherein the anti-reflective coating includes a first layer comprising Ta<sub>2</sub>O<sub>5</sub>, a second layer comprising Al<sub>2</sub>O<sub>3</sub>, a third layer comprising Ta<sub>2</sub>O<sub>5</sub>, and a fourth layer comprising SiO<sub>2</sub>; and

a data detector that detects a hologram reconstructed when the laser beam illuminates the holographic recording medium at an incident angle greater than approximately 50 degrees relative to a line normal to the surface of the medium.

Claim 19 (Currently amended): A method comprising:

forming an anti-reflective coating on a holographic data storage medium to limit reflectivity of S-polarized light at incident angles greater than approximately 50 degrees relative to a line normal to the surface of the medium to less than approximately 1.0 percent, wherein forming the anti-reflective coating includes:

forming a first layer comprising Ta<sub>2</sub>O<sub>5</sub>;

forming a second layer comprising Al<sub>2</sub>O<sub>3</sub>;

forming a third layer comprising Ta<sub>2</sub>O<sub>5</sub>; and

forming a fourth layer comprising SiO<sub>2</sub>.

Claim 20 (Original): The method of claim 19, further comprising forming the anti-reflective coating such that transmittance of the coating is greater than approximately 95 percent.



Claim 21 (Currently amended): The method of claim 19, further comprising:

storing a hologram in the holographic data storage medium using an object beam and a reference laser-beam directed toward the holographic data storage medium, wherein at least one of the object beam and reference beam is directed toward the holographic data storage medium at an incident angle greater than approximately 50 degrees relative to a line normal to the surface of the medium.

Claim 22 (Currently amended): The method of claim 19, further comprising:

reconstructing a hologram stored in the holographic data storage medium using the reference a laser-beam directed toward the holographic data storage medium at an incident angle greater than approximately 50 degrees relative to a line normal to the surface of the medium.

20 Claim 23 (New): A holographic data storage system comprising:

a laser that produces at least one laser beam;

optical elements through which the laser beam passes;

a holographic recording medium including an anti-reflective coating on a surface of the medium, wherein the anti-reflective coating limits reflectively such that the medium exhibits less than 1.0 percent reflectivity of S-polarized light at an incident angle greater than approximately 50 degrees relative to a line normal to the surface of the medium wherein the anti-reflective coating includes:

a first layer comprising approximately 80 percent by weight ZnS and approximately 20 percent by weight SiO<sub>2</sub>,

a second layer comprising SiO<sub>[X]</sub>N<sub>[Y]</sub>, wherein X is a rational number between approximately 0 and 2 and wherein Y is a rational number between approximately 0 and 1.33,

a third layer of comprising approximately 80 percent by weight ZnS and approximately 20 percent by weight SiO<sub>2</sub>, and

a fourth layer comprising SiO<sub>2</sub>; and

a data detector that detects a hologram reconstructed when the laser beam illuminates the holographic recording medium at an incident angle greater than approximately 50 degrees relative to the line normal to the surface of the medium.

Claim 24 (New): A method comprising:

forming an anti-reflective coating on a holographic data storage medium to limit reflectivity of S-polarized light at incident angles greater than approximately 50 degrees relative to a line normal to the surface of the medium to less than approximately 1.0 percent, wherein forming the anti-reflective coating includes:

forming a first layer comprising approximately 80 percent by weight ZnS and approximately 20 percent by weight SiO<sub>2</sub>,

forming a second layer comprising SiO<sub>[X]</sub>N<sub>[Y]</sub>, wherein X is a rational number between approximately 0 and 2 and wherein Y is a rational number between approximately 0 and 1.33,

forming a third layer of comprising approximately 80 percent by weight ZnS and approximately 20 percent by weight SiO<sub>2</sub>, and

forming a fourth layer comprising SiO<sub>2</sub>.

### **REMARKS**

This amendment is responsive to the Office Action dated April 23, 2004. Applicant has amended claims 1-5, 11, 12, 13, 18, 19, 21 and 22; canceled claims 7, 8 and 10; and added new claims 23 and 24. Claims 1-6, 9 and 11-24 are now pending.

#### **Claim Rejections Under 35 U.S.C. § 112**

In the Office Action, the Examiner rejected claims 1-17 and 18 under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. In particular, the Examiner indicated that claims 1-17 and 18 are not enabled because the specification does not teach how an anti-reflective coating is capable of “causing the medium to have less than 1.0 percent reflectively of S-polarized light.” The Examiner stated that anti-reflective coatings reduce reflectively but do not “cause” the medium to have this reduced reflectively.

Applicant respectfully disagrees with the Examiner’s semantic distinctions and rejections of claims 1-17 and 18 under 35 U.S.C. 112, first paragraph. Applicant’s specification provides an enabling disclosure that would have enabled a person with ordinary skill in the art to make and use the invention as originally claimed. Moreover, Applicant submits that the claimed anti-reflective coating does “cause” the medium to have less than 1.0 percent reflectively of S-polarized light insofar as the medium would not have such reflective characteristics but for the anti-reflective coating, and inasmuch as the anti-reflective coating forms an integral part of the claimed medium.

Notwithstanding Applicant’s traversal of the rejections of claims 1-17 and 18 under 35 U.S.C. 112, however, Applicant has amended these claims to address the Examiner’s semantic concerns. These amendments are unrelated to patentability, but simply clarify the semantics of the claimed invention in a manner requested by the Examiner. The pending claims now specify that the anti-reflective coating limits reflectivity such that the medium exhibits less than 1.0 percent reflectivity of S-polarized light. Applicant believes that this amendment addresses the Examiner’s concern with respect to the term “cause.”

The Examiner also rejected claim 21 as lacking enablement. In particular, in rejecting claim 21, the Examiner indicated that the specification fails to teach how a hologram can be stored using a laser beam directed toward the medium. The Examiner noted that holographic

recording requires interference between two coherent light beams and, therefore, claim 21 is not enabled because it does not specifically recite two light beams.

With regard to claim 21, Applicant again respectfully traverses the rejection. The language of original claim 21 does not preclude the use of two coherent light beams, but simply recites that the holographic recording uses a light beam. In this sense, the laser beam that is "used," as recited in original claim 21, could be the object beam or the reference beam. However, Applicant submits that original claim 21 does not lack enablement because claim 21 recites a beam, which, for example, could refer to either the object beam or the reference beam. Moreover, claim 21 is cast in open format and clearly may encompass the inclusion of a second beam.

Nevertheless, in the interest of expediting prosecution toward issuance, Applicant has amended claim 21 to recite both the object and reference beam, which should address the Examiner's concerns. This amendment is also unrelated to patentability, and simply clarifies the invention in a manner requested by the Examiner.

In view of the amendments to the claims, addressed above, Applicant believes that all pending claims meet the enablement requirement of 35 U.S.C. 112, first paragraph.

#### **Claim Rejections Under 35 U.S.C. § 103**

In the Office Action, the Examiner rejected claims 1-9, 12 and 18-22 under 35 U.S.C. 103(a) as being unpatentable over Karim et al. (Appl. Phys. Lett. 70 (210, 1997)) in view of Murata et al.(US 6,574,039); and rejected claims 16 and 17 under 35 U.S.C. 103(a) as being unpatentable over Karim in view of Murata, and further in view of Chen et al. (US 6,593,977).

The Examiner indicated that the following subject matter would be allowable: *the anti-reflective coating on a holographic medium that makes the S-polarized light incident on the medium at an angle greater than 50 degrees to have reflectively less than 1 percent, where the anti-reflective coating has the specific designs set forth in claims 10-11 and 13-15.*

Applicant agrees with the Examiner that the specific designs set forth in claims 10-11 and 13-15 recite patentable subject matter, but Applicant also believes that the subject matter recited in intervening claims 9 and 12 is not necessary to distinguish the applied references.

Accordingly, Applicant has amended claim 1 to include the limitations formerly recited in claim 10, but Applicant has not included the additional limitations of intervening claim 9 into independent claim 1. Similarly, Applicant has amended claim 13 to be in independent form, including all the limitations formerly recited in claims 1 and 13, but Applicant has not added the limitations of intervening claim 12 to independent claim 13.

Applicant has also amended claim 18 to include the limitations formerly recited in dependent claim 10, which the Examiner indicated as being patentable subject matter. Applicant has also amended independent method claim 19 to recite the formation of the specific layers formerly recited in claim dependent 10.

New claims 23 and 24 have been added. New claim 23 recites a system including features formerly recited in claim 13, which the Examiner indicated as being patentable subject matter. New claim 24 recites a method claim including the formation of the specific layers formerly recited in claim 13.

### **Conclusion**

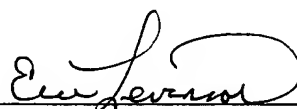
All claims in this application are in condition for allowance. Applicant respectfully requests reconsideration and prompt allowance of all pending claims. Please charge any additional fees or credit any overpayment to deposit account number 09-0069. The Examiner is invited to telephone the below-signed attorney to discuss this application.

Date:

7/23/4

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